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A Comparison of Mammography and Ultrasonography in the Evaluation of Breast Masses in Early Stage

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Abstract

Breasts are one of the secondary sexual characteristics in females. They are the rout for of nutrition & growing of infant till 4-6 months of age.

Breast diseases are one of the most common diseases in the females of any society. Multiple types of benign breast lesions like fibroadenomas, simple cyst, breast abscess, lymph nodes enlargement and different malignancies are common pathologies of the breast.

Up to 30% of women suffer from benign breast disease at any time of their life and this compels them to take the treatment.

The prospective clinical study was achieved for 283 women (age was ranged between 20–60 years) had palpable breast lesion referred by their managing surgeons to the radiological department at Azadi Teaching Hospital, for a period of 8 months (from January 2018 to August of the same year). The study depended firstly in all women on clinical examination/self-breast examination.

Results:- 283 patients were included in this study with age between 20 _ 60 ys, most of the patients were diagnosed as fibroadenoma which is most common around 54.9% of the total cases studied, Fibrocystic diseases (Duct ectasia, cysts, and galactocele) 19.3 %.Followed by infection as mastitis 15.4%, and phyllodes tumor less than 1% approximately and finally carcinoma 9.5%.

In conclusions, the results of our study are encouraging to applying the US for masses for differentiating if it pointing to benignant or malignancy status and sonography shouldn't be generally applied to defer the biopsy of a solid mass.

Keywords— Ultrasonography, Mammography, Breast Masses.

مقارنة بين التصوير الشعاعي للثدي و الفحص بالموجات فوق الصوتية في الكشف عن كتلة الثدي في مرحلة مبكرة

الخلاصة

الثدي هو احد المميزات او الصفات الجنسية الثانوية للاناث. وهو الوسيلة لتغذية الطفل الرضيع خلال 4-6 أشهر الاولى من العمر. امراض الثدي هي احد اكثر الامراض انتشارا لدى الاناث في جميع المجتمعات. هناك انواع متعددة من امراض الثدي منها الحميدة مثل الورم الغدي الليفي, كيس بسيط, خراج الثدي والتهاب العقد اللمفاوية و منها الخبيثة كسرطان الثدي.

30% من النساء تعاني من امراض الثدي الحميدة في اي وقت من حياة المرأة و يجبرها على اخذ العلاج.

يتضمن الفحص السريري , الصور الشعاعية (الفحص بالموجات فوق الصوتية و التصوير الشعاعي للثدي) و الفحص النسيجي الذي يمتاز الآن بدوره الاساسي في تشخيص كتلة (ورم) الثدي.

تم انجاز دراسة استطلاعية ل 283 انثى (بعمر بين 20 الى 60 سنة) لديها كتلة في الثدي و تم احالتها من خلال الجراح المعالج لقسم الاشعة والسونار في مستشفى آزادي التعليمي في مدينة كركوك ولمدة 8 اشهر (من شهر كانون الثاني 2018 الى شهر اب للسنة نفسها) , الدراسة اعتمدت مبدئيا على الفحص الذاتي و الفحص السريري للثدي.

شملت الدراسة 283 مريضة من عمر 20 الى 60 سنة معظمهم كانوا يعانون من ورم غدي ليفي بنسبة 54.9 % من الحالات و مرض الثدي الكيسي الليفي (توسع القنوات الثديية , كيس بسيط و قيلة لبنية) بنسبة 19.3 % يتبعها التهاب الثدي 15.4 % ثم ورم فابلود (ورم ورقي الشكل) بنسبة اقل من 1% تقريبا وأخيرا سرطان الثدي بنسبة 9.5 %..

خلصت هذه الدراسة الى التشجيع على استخدام الفحص بالموجات فوق الصوتية لتشخيص كتل الثدي و تمييزها ان كانت حميدة أم خبيثة وان الفحص بالموجات فوق الصوتية غير قادر على تشخيص الكتل الصلبة.

1. INTRODUCTION

Breasts are one of the secondary sexual characteristics in females. They are the rout for of nutrition & growing of infant till 4-6 months of age. This tender, sensitive and delicate complex structure is constantly under the influence of hormones.[1]

Multiple types of benign breast lesions like fibroadenomas, simple cyst, breast abscess, lymph nodes enlargement and different malignancies are common pathologies of the breast. [2]

Breast cancer is the commonest cause of malignant mortality in women, while this cancer in males presented only 0.7% of all breast cancer. [3]

Up to 30% of women suffer from benign breast disease at any time of their life and this compels them to take the treatment. Even though the majority of the breast complaints are benign breast disease, compared to malignancy it is a neglected entity. So, an in-depth understanding of its significance and right treatment can be instituted so that long term follow up can be avoided.

The percentage of occurring of benign breast lesions begins to increase during the second decades of life and reached the top between 40 – 60 yrs of age, whereas, in malignant type, the incidence continues to increase after menopause also. [4]

Screening and diagnostic effort:- Triple assessment, includes clinical examination, imaging, and histopathology examination is now presented as a gold standard role in the diagnosis of the breast lump. Early diagnosis and treatment will avoid unnecessary surgery and patient's anxiety of having breast lump as carcinoma will be relieved.

Diagnosis of breast carcinoma in the earliest possible stage is the ultimate goal in imaging the breast, and the role of the radiologist is therefore vital. Radiology mainly includes MG (mammography) and USG (ultrasonography) then the biopsy. The percentage of carcinoma occulting which leading to deaths can be decreased by 30 % by the routine screening of healthy women with mammography. Asymmetry, no density, distortion of fibroglandular content & micro_calcifications are detected earlier than those become clinically palpable, or which are detected by self-examination. [4,5]

Ultrasonography plays an excellent role in differentiating cystic and solid lumps. It is useful in the evaluation of palpable masses not visible radiologically in dense breasts, abscesses, masses that are not completely evaluable with and in a young female who has susception of radiation damage.[6]

Both mammography and ultrasonography methods have been used in attempts to reduce the negative to positive biopsy ratio.[7]

Normal breast parenchymal patterns:-

In the young non-lactating one, the parenchyma primarily consists of fibroglandular tissue, few or no subcutaneous fat. With increasing age and parity, a lot of fat will be deposited in both the subcutaneous and retromammary tissue.

Common abnormal appearances and lesions of the breast: -

Breast cysts: It is the commonest cause of breast masses in women between thirty-five and fifty yrs. this lump occurs when fluid accumulated due to obstruction of the extralobular terminal ducts. It is seen on USG as a well-defined, round or oval, anechoic structure with a thin wall. It may be solitary or multiple [8]

Duct ectasia: This lesion has a variable appearance. Typically, duct ectasia may appear as a single tubular structure filled with fluid or sometimes may show multiple such structures as well. Old cellular debris may appear as echogenic content. If the debris fills the lumen, it can be sometimes mistaken for a solid mass, unless the tubular shape is picked up[5][6]

Chronic abscess of the breast: Patients may present with fever, pain, tenderness to touch and increased white cell count, most commonly located in the central or subareolar area. An abscess may show an ill-defined or a well-defined outline. It may be anechoic or may reveal low-level internal echoes and posterior enhancement.

A variety of inflammatory and reactive changes can be seen in the breast. While some of these changes are a result of infectious agents, others do not have a well-understood etiology and may represent the local reaction to a systemic disease, or a localized antigen-antibody reaction, and are classified as idiopathic.

Fibroadenoma: It is an estrogen-induced tumor that forms in adolescence. It is the third most common breast lesion. It usually presents as a firm, smooth, oval-shaped, freely movable mass. It is rarely tender or painful. The size is usually under 5 cm. Calcifications may occur. On USG, it appears as a well-defined lesion. The echotexture is usually homogenous and hypoechoic as compared to the breast parenchyma.[9]

Cystosarcoma phyllodes: It is a big mass or lump which is occurring usually with increasing females' age. Some consider it as a giant fibroadenoma. It may involve the whole of the breast. Usually appear as well marginated area & an inhomogeneous echostructure, may present with variable cystic lesions. The chance of malignant changing is low.

Malignant lesion: It presents clinically with lesion or mass, retracted nipple, pain & discharge of blood, ulceration over breast skin. these lesions on MG appear irregular lump, speculated or lobulated margins, focal, asymmetry, the lesion appears longer than wider, the nipple is retracted, calcification may be linear, granular, clustered with surrounding architectural distortion.[3]

Various limitations of mammography (MG) and ultrasonography (USG):- In mammography, Solid & cystic lesions can't be differentiated, intracystic lesions cannot be detected in young one has dense fibroglandular tissue with obscure masses, mastitis may mask the margins of a lump benign lump appears malignant & overlapping structures some time limit complete visualization of a mass abscess and tuberculosis may mimic carcinoma.

In ultrasonography, Operator dependent, isoechoic masses may be missed mostly when are small, circumscribed carcinoma may be labeled as benign masses, lesions within large fatty breasts are difficult to diagnosis.[5]

2. AIM OF WORK

1. To study the accuracy of ultrasonography & mammography separately and in combination for diagnosis of breast lesions (correlation between them) and association of the age with the suitable device.
2. To confirm the combining ultrasound with the mammogram to increase the cancer detection rate in early stages.

3. Patients and methods

The prospective study was achieved for 283 women (age range was 20–60 years) had palpable breast lesion referred by their managing surgeons to the radiological department at Azadi Teaching Hospital, for the period of 8 months (from January 2018 to August of the same year). Study depended firstly in all women on clinical examination/self-breast examination. All US examinations were performed with the type of ultrasonography, siemens versa with a 7-MHz linear-array transducer& mammography type BP34 78533 BUC CEDEX-FRANCE.

If we had adopted about any cases, referred to fine needle aspiration and biopsy and wait for the result to confirm the diagnosis.

Inclusion criteria :

All patients with clinically palpable lump; no obvious mass on palpation but prominent axillary nodes and those have signs of redness over the breast, dryness, nipple retraction, discharge or shape changing.

Exclusion criteria

Cases with any obvious cancer or previous biopsy has proven malignant diseases which had been treated for malignancy earlier or operated were excluded.

4.RESULTS & DISCUSSION:

A total of 283 patients were included in this study with age between 20 _ 60 ys, most of the patients were diagnosed a fibroadenoma which is most common around 54.9% of the total cases studied, Fibrocystic diseases (Duct ectasia, cysts, and galactocele) 19.3 %. Our study was consistent with the study done by Shilpa N et al[11] and Mallikarjuna et al[12]; Shilpa N et al[11] reported 55.68% fibroadenoma followed by fibroadenosis 20.45% cases and Mallikarjuna et al. [12] reported 72% cases of fibroadenoma with about 13% in Malik MAN et al.[13] Followed by infection as mastitis 15.4%, and phyllodes tumor less than 1% approximately similar to Malik MAN et al.[13] which was 0.4% and dislike with Dr. Golam Sarwar's study[14] which was 8%; finally carcinoma 9.5%.

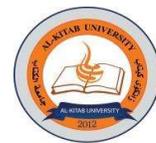


Table 1 was represented 107 patients between 20_30 ys were most of them had Fibroadenoma then Infection; Mastitis, a fibrocystic disease similar to *Selvakumaran S et al.* [4] study and two cases had carcinoma.

Table 1:- The relation between patients 'age and types of lesion.

| Type of lesion | Age Group (years) | Infection ; Mastitis 44 | Fibrocystic disease 53 | Fibroadeno -ma 158 | Phylloids tumour 2 | Carcinoma 26 | Total 283 |
|-----------------|-------------------|----------------------------|---------------------------|-----------------------|-----------------------|-----------------|--------------|
| No. of patients | 20 - 30 | 24 | 6 | 75 | - | 2 | 107 |
| | 30 - 40 | 16 | 23 | 60 | 1 | 6 | 106 |
| | 40 - 50 | 4 | 20 | 18 | 1 | 10 | 53 |
| | 50 - 60 | - | 4 | 5 | - | 8 | 17 |

While between 30_40 is mainly also had Fibroadenoma but the fibrocystic disease was more than the first category and less had Infection, our results similar proximity to similar to *Selvakumaran S et al.* [4] and Dr. GolamSarwar's study[14]; with 2& 6 cases of carcinoma respectively in both age. By age of 30_40, 40_50 & 50_60 ys, this table is shown decrease incidence of benign masses but unfortunately, the bad news is increasing the incidence of malignant lesion out of 6, 10 & 8 cases respectively; this gone with Chlebowski et al & ABMZ Sadik et al[16]studies.

Table 2: USG & MG finding in diagnosis various types of breast lesion with comparative analysis

| Types of lesion | No. Of Cases | USG Alone | Mammography Alone | Combined |
|---------------------|--------------|------------|-------------------|------------|
| infection;mastitis | 44 | 42 (95%) | 36 (82%) | 44 (100%) |
| Fibrocystic disease | 53 | 53(100%) | 28(52%) | 53(100%) |
| Fibroadenoma | 158 | 91(58%) | 128(81%) | 150(96%) |
| Phyllodes a tumor | 2 | 1 (50%) | 2 (100) | 2 (100%) |
| Carcinoma | 26 | 16 (70%) | 24 (89%) | 25 (96%) |
| Total | 283 | 247 | 194 | 281 |

In table 2 this study revealed 26 patients diagnosed as carcinoma where the MG detected 24 (89%) like K. TAORI *ET AL.*³ studies who said (Mammography is nearly 87% accurate in detecting cancer) & USG alone detected only 16(70%), as same as Stavros *et al.*[17] who found overall accuracy of 72.9% but dislike with P.K. Tiwari *et al.* [7] study in which (22.22%) only diagnosed cancer in USG it may be because ultrasounds are unable to detect microcalcifications (small mineral deposits in the breast that indicate the possibility of malignancy)[18], while combined of them missed only one case which confirmed by fine needle aspiration.. Out of 44 cases of fibrocystic mastitis, MG alone picked 36 whereas the USG missed only 2 and combined way detected 100% of cases. There were 55 cases of the cyst, which was clearly 100% detected by USG, but the MG picked up only 28. Of 156 cases of fibroadenoma, the MG detected 128 and the USG detected 91 with combined test missed only 6 cases. Finally, 2 cases of phyllodes tumor diagnosed, 1 by USG while both cases detected by MG successfully

In the general US can diagnose approximately two-thirds of a benign solid breast mass and distinguish from malignant one, the result goes with dr. Osamah Ayad study. [19]

All these results make understanding that the value of combined mammographic and sonographic imaging in symptomatic patients very high which reached 100% in some types of lesion, but is not 100 % sensitive and specific that similar to P.K. Tiwari et al study. [7]

5. Conclusions and Recommendations

In conclusions, the results of our study are encouraging to applying the US for masses for differentiating if it pointing to benign or malignancy status and sonography should not be generally applied to defer the biopsy of a solid mass.

We suggest further studies that include a larger number of cases, a longer period of study. We recommend making use of biopsies (Fine Needle Aspiration and True-cut) in adopt breast mass

Breast imaging inves should be encouraged and make it a routine screen, available countrywide in order to reduce cancer mortality especially in older women

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